

## Instructions for Service Kit 39733

# High Limit Conversion Kit for PS300, 310, 350, & 360 Ovens

**KIT COMPONENTS** - Check that the kit includes ALL of these parts BEFORE you begin!

<u>Qty.</u>	<u>P/N</u>	<u>Description</u>	<u>Qty.</u>	<u>P/N</u>	<u>Description</u>
1	39732	Instructions	2 ft./610mm	27152-0050	Wire, #18 AWG, brown
1	34982	Watlow high limit control module	2 ft./610mm	27152-0053	Wire, #18 AWG, white
1	30693	Reset switch w/ lighted pushbutton	2 ft./610mm	27152-0054	Wire, #18 AWG, purple
1	35634	Mounting bracket, reset switch	8	1455A8750	Wire connector, 1/4"/6.4mm
1	35691	Wire set, reset switch ( <i>includes 4 wires and 3 1/4"/25mm connectors</i> )	1	3002693	Wire tie, nylon
1	33812-1	Thermocouple, type J, 6"/152.4mm	2	2000076	Screw, 6-32 X 1-5/8"
1	39690	Mounting sleeve, thermocouple	2	1421B8803	Screw, 6-32 X 1/4"
			4	2001327	Nut, 6-32

## TOOLS REQUIRED

- Drill with 3/16" drill bit
- Middleby Marshall Thermocouple Signal Source Generator (P/N 27170-0192)
- Wire cutters/strippers

## A. OVERVIEW

This Service Kit is used to replace two different types of United Electric high limit/cooldown controllers with a Watlow high limit controller for PS300, 310, 350, and 360 Ovens. See Figure 1.

- The early (Type 54) United Electric control was ONLY equipped with a high limit circuit. Ovens equipped with this control did NOT have a cooldown circuit. This control was used on the following models:

- PS300/350 Gas (early)
- PS300/310/350/360 Electric (early - all voltages)

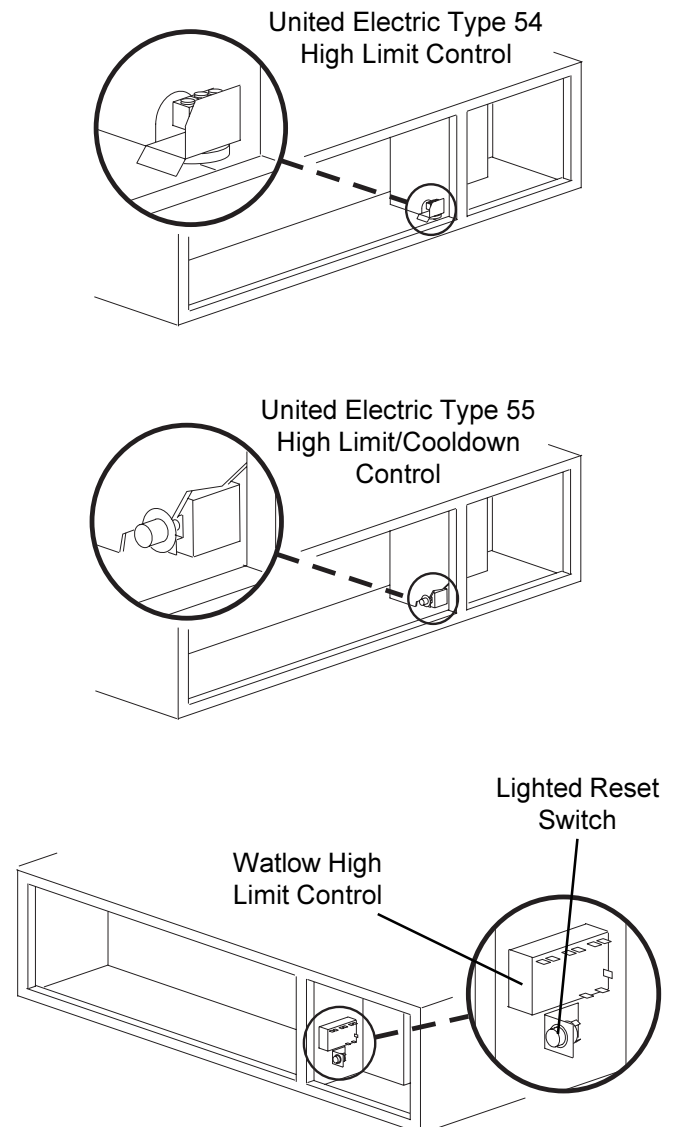
For these ovens, the kit directly replaces the Type 54 high limit control with the Watlow high limit control.

- The later (Type 55) United Electric control was equipped with BOTH high limit and cooldown circuits, and was used on the following models:

- PS300/310/350/360 Electric (late), 208/240V and 480V UL versions ONLY

For these ovens, the kit replaces the Type 55 control with the Watlow high limit control, and uses the oven's temperature controller to provide the cooldown circuit.

**Figure 1**



## B. INSTALLATION

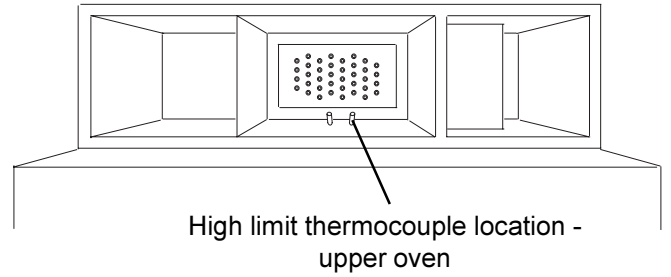
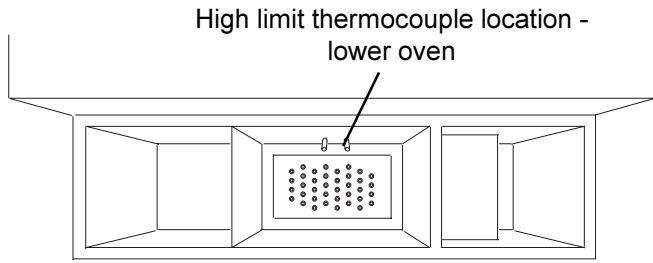


### **WARNING**

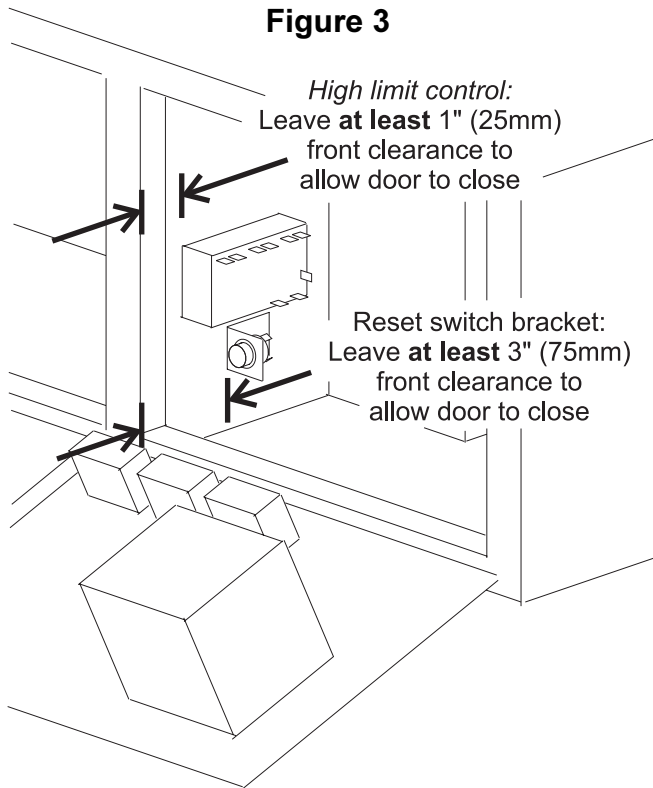
*BEFORE PERFORMING ANY SERVICE WORK, THE GAS SUPPLY (IF SO EQUIPPED) AND THE ELECTRICAL SUPPLY TO THE OVEN MUST BE TURNED OFF.*

1. Open the machinery compartment and control compartment access panels.
  2. Locate the high limit thermo bulb/capillary assembly. Its location is shown in Figure 2. Loosen the set screw that holds the assembly in place. Remove the thermo bulb/capillary assembly from the mounting tube.
  3. Disconnect the wires (2 for the Type 54 control, 4 for the Type 55 control) from the terminals of the United Electric control. Bundle the loose wires together, and allow them to hang loose for later reconnection.
  4. Remove the mounting screws that hold the United Electric high limit control in place. Then, remove and discard the high limit control and its mounting screws.
  5. Position the new high limit control in place on the left wall of the control compartment, as shown in Figure 3. When positioning the control:
    - Ensure that the control is positioned AT LEAST 1" (25mm) back into the compartment to allow the compartment door to close.
    - Ensure that additional space is left underneath the control for the reset switch.
- NOTE:** *Instead of holding the high limit control in place, you may use the dimensions provided in Figure 4 to determine the location of the control and its mounting holes.*
6. Mark the locations of the two mounting holes for the high limit control. Then, drill the holes using a 3/16" drill bit.
  7. Secure the high limit control in place using the kit-supplied 6-32 x 1-5/8" screws and 6-32 nuts.
  8. Position the bracket for the reset switch on the left wall of the control compartment, as shown in Figure 3. Note that the face of the bracket with the large, circular switch-mounting hole should face YOU. Also, the bracket should be positioned AT LEAST 3" (75mm) back into the compartment to allow the door to close.
  9. While holding the bracket in place, mark the locations of the two mounting holes. Then, remove the bracket and drill the holes using a 3/16" drill bit.
  10. Secure the bracket to the panel using the kit-supplied 6-32 x 1/4" screws and 6-32 nuts. **DO NOT INSTALL THE RESET SWITCH INTO THE BRACKET AT THIS TIME.**
  11. Insert the kit-supplied thermocouple into its mounting sleeve. Position the sleeve so that the mounting hole is at the base of the thermocouple, not the tip. See Figure 5.
  12. Insert the thermocouple and mounting sleeve into the original mounting tube. The set screw opening in the sleeve should align with the set screw hole on the side of the mounting tube.  
Push the thermocouple into the opening until its base seats firmly on the mount. See Figure 6.
  13. Insert the thermocouple's set screw into the hole on the side of the mounting tube. Tighten the set screw to hold the thermocouple and sleeve in place.
  14. Thread the thermocouple's shielded cable into the electrical compartment. Coil the free end of the cable and fasten it with the kit-supplied nylon wire tie. Be sure to leave enough free cable to reach the new high limit control.

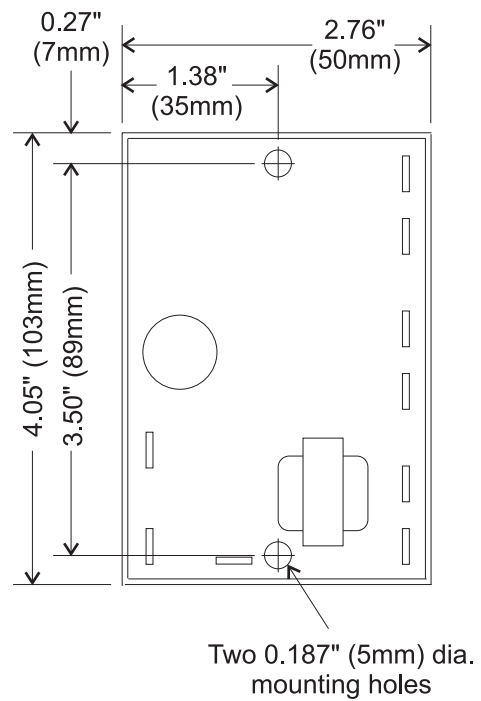
**Figure 2**



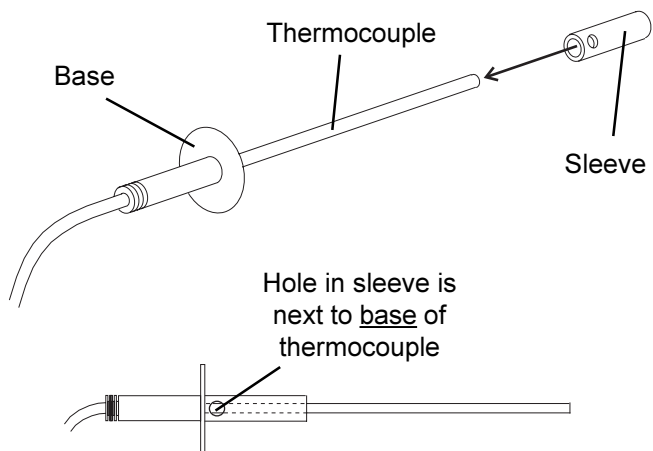
**Figure 3**



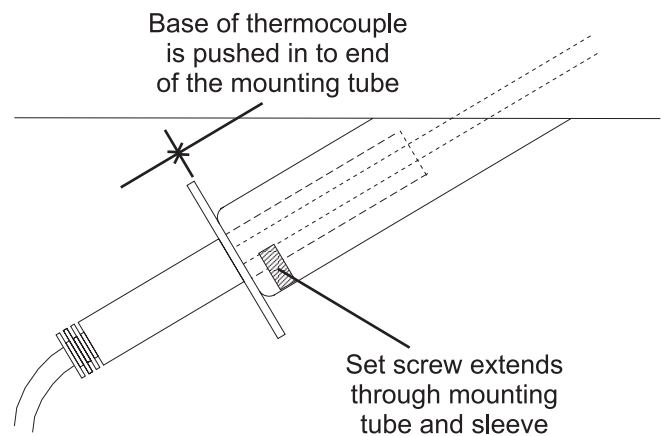
**Figure 4**  
**NOT TO SCALE**



**Figure 5**



**Figure 6**



## C. WIRING

For the various wiring connections listed below, cut the kit-supplied #18 AWG wires to length. Refer to Figures 7 and 8 (on pages 6 and 7) for diagrams of the wiring connections.

### ***Lighted Reset Switch Wiring and Installation***

14. Using the kit-supplied 1/4" wire connectors, connect the following kit-supplied wires:
  - Red wires ..... connect one wire to each "RESET" terminal on the high limit control
  - Black wire ..... connect to terminal "NC" on the high limit control
  - White wire ..... connect to terminal "L2" on the oven's temperature controller
15. Slip the free ends of these four wires through the circular hole in the reset switch mounting bracket, so that they hang down in front of the control compartment.
16. Use the kit-supplied 1/4" wire connectors to connect these four wires to the terminals on the lighted reset switch.
  - Terminals 1 and 3 ..... Red wires (these connections are interchangeable)
  - Terminal 2 ..... Black wire
  - Terminal 4 ..... White wire (kit-supplied)
17. Push the lighted reset switch through the mounting hole in the center of the bracket until it snaps into place. Be sure to avoid pinching the wires against the sides of the mounting hole.

### ***Cooldown circuit wiring***

NOTE: Perform steps 18 and 19 ONLY if you are replacing a UE Type 55 controller. If you are replacing a UE Type 54 controller (which has no cooldown circuit), skip ahead to Step 20.

18. Attach the oven's existing cooldown wiring to the following terminals on the oven's Temperature Controller, as shown in Figures 7 and 8.

*For Ovens with a Digital Temperature Controller:*

- a. Terminal 9 ..... Black wire (from blower switch)
- b. Terminal 10 ..... Brown wire (from blower switch)

*For Ovens with an Analog Temperature Controller:*

- a. Terminal 13 ..... Black wire (from blower switch)
- b. Terminal 14 ..... Brown wire (from blower switch)

19. Attach a brown kit-supplied wire between the following terminals on the Temperature Controller:

Digital Controller ..... Terminals 10 and "L1"  
Analog Controller ..... Terminals 13 and "L1"

### ***High Limit Control wiring***

20. Using the kit-supplied 1/4" wire connectors, wire the high limit control terminals as follows:
  - a. Terminal "NO" ..... Purple wire (originally to UE control)
  - c. Terminal "TC +" ..... White wire (to thermocouple) - DO NOT CUT THIS WIRE TO LENGTH.
  - d. Terminal "TC -" ..... Red wire (to thermocouple) - DO NOT CUT THIS WIRE TO LENGTH.
  - f. Terminal "L2" ..... White wire (kit-supplied; to neutral on the oven's terminal block)
  - h. Terminal "COM" ..... Orange wire (originally to UE control)
21. Using a 1/4" wire connector, attach a brown kit-supplied wire to the "L1" terminal on the high limit control. Attach the free end of the wire to the "L1" terminal on the temperature controller.

## D. TESTING THE INSTALLATION

22. Remove the thermocouple wires from the "TC +" and "TC -" terminals on the high limit control.
23. Attach a Middleby Marshall Thermocouple Source (P/N 27170-0263) to the "TC +" and "TC -" terminals on the high limit control, in place of the thermocouple wires. Note that it may be necessary to attach a pair of terminal connectors to the leads of the Thermocouple Source to allow them to connect to the high limit control's terminals.
24. Restore the gas supply (if so equipped) and the electrical supply to the oven. Because the control compartment door is still open, pull the door safety switch out into the "service" position.
25. Test the operation of the high limit control as follows:
  - a. Set the Thermocouple Source to a normal operating temperature, between 200°-600°F (93°-315°C).
  - b. Turn the oven on, and allow it to heat to 600°F (315°C).
  - c. After the oven has reached the setpoint temperature, set the Thermocouple Source to 700°F (371°C).  
The high limit control is set to open at any temperature in excess of 650°F (343°C). This will shut down the oven's heat circuit and illuminate the Reset Switch lamp.
26. Set the Thermocouple Source to a temperature setting below 600°F (316°C), and depress the Reset Switch. This should turn off the Reset Switch lamp and restore heat circuit operation.
27. Turn the oven off.
28. If you replaced a UE type 55 controller (with a cooldown circuit), you must set the Thermocouple Source to a temperature setting below 200°F (93°C). Then, wait for the blowers to turn off.
29. Press the door safety switch in to reset it to normal.
30. Remove the Thermocouple Source from the oven.
31. Reattach the thermocouple wires to the high limit control's terminals as follows:  
White wire ..... "TC +"  
Red wire ..... "TC -"
32. Close the machinery compartment and control compartment access panels, and fasten them in place. The oven is now ready for normal operation.

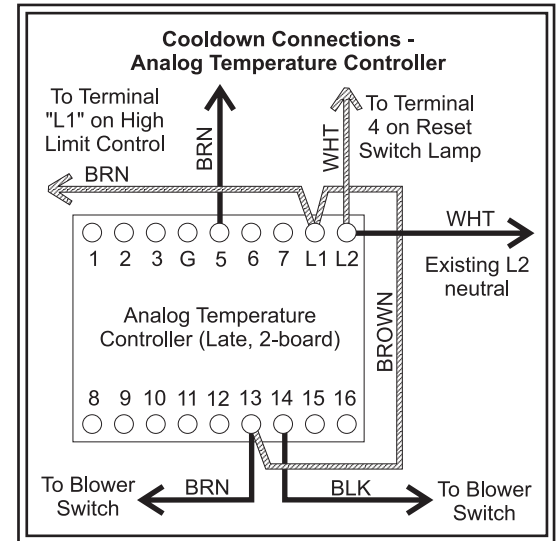
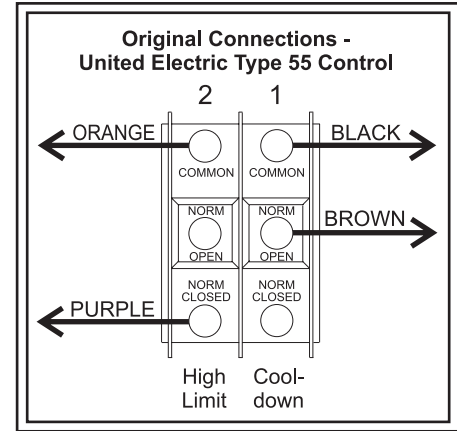
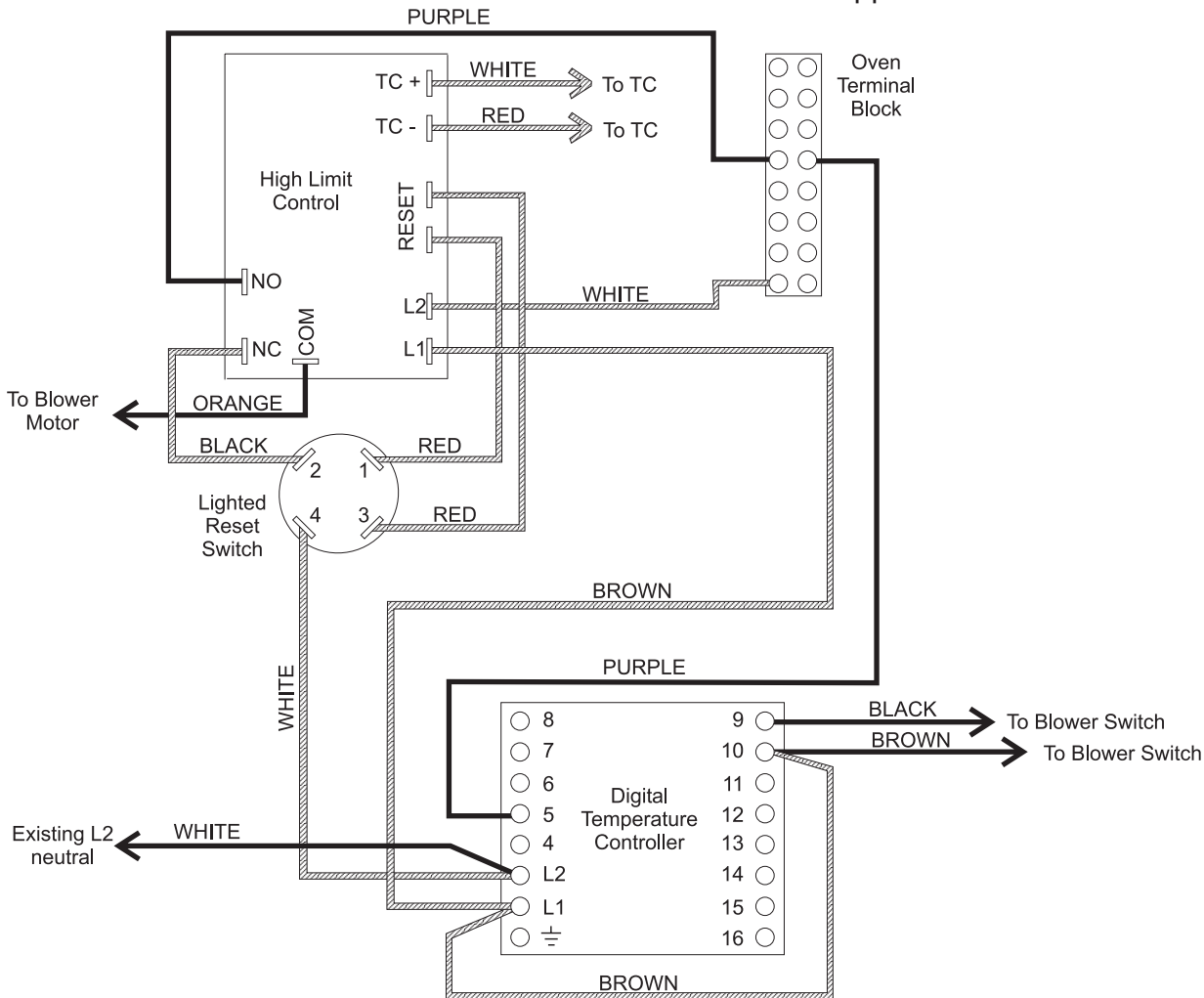
Figure 7 - United Electric Model 55 replacement: ovens with a cooldown feature

KEY

Existing Wire in Oven

Kit-Supplied Wire

Page 6 of 8

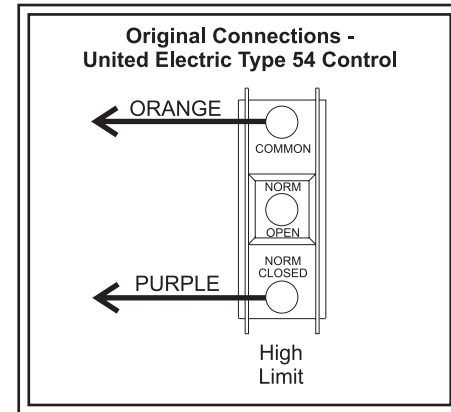
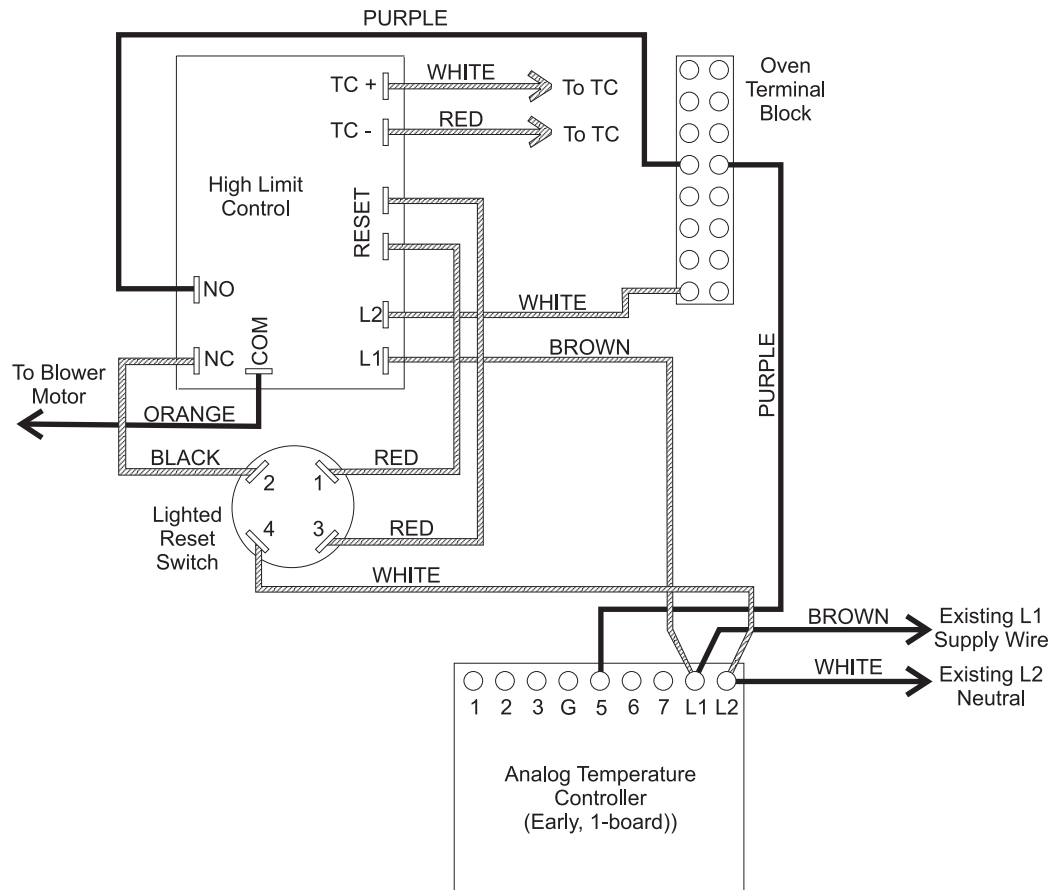


**Figure 8 - United Electric Model 54 replacement: ovens without a cooldown feature**

**KEY**

Existing Wire in Oven

Kit-Supplied Wire





Middleby Cooking Systems Group • 1400 Toastmaster Drive • Elgin, IL 60120 • USA • (847) 741-3300 • FAX (847) 741-4406

**Middleby Corporation Service Hotline 1-800-238-8444**

***[www.middleby.com](http://www.middleby.com)***